In response to the most recent Office Action in this case mailed March 25, 2002, the undersigned attorney acting on behalf of Applicant responds as follows:

Petition for one-month extension of time

Applicant has filed a petition for a one-month extension of time for reply, extending the time to July 25, 2002. Should the USPTO determine that this response was not filed prior to the fourth month deadline, please consider this response to include a petition for an additional extension of time and charge Deposit Account 07-1897 for any relevant fees.

REMARKS

Claims 1-23, 28-34, and 40-67 are pending in this broadening reissue application. The Examiner allowed claims 1-23, 28-33, 40-58, and 63-67; and disallowed claims 59-62. The Office Action is silent with respect to claim 34, but Applicant's attorney is presuming claim 34 is allowed because it depends from allowed claim 28. The Applicant thanks the Examiner for his attention to this broadening reissue application. As discussed below, all of the pending claims are in condition for allowance.

Original Patent

The Assignee will surrender the original patent, or will submit a declaration as to loss or inaccessibility of the original patent, after the Examiner indicates that all of the pending claims are allowable.

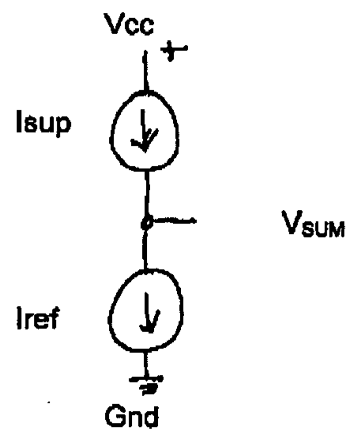
Oath

The Applicant will file a supplemental reissue declaration upon completion of prosecution and satisfaction of the Examiner's objections and/or rejections to the claims.

R jection of Claims 59-62 under 35 U.S.C. § 102(b)
in View of U.S. Patent 4,350,904 to Cordell

As discussed below, the Applicant respectfully continues to disagree with this rejection.

Claim 59 recites generating a reference current having a temperature coefficient, and comparing the reference current to a supply-related current that has or approximately has the same temperature coefficient. The following sketch is a simplification of FIG. 2 of the patent application and illustrates an example of claim 59:



The reference current source Iref has a temperature coefficient, and a supply-related current source Isup has the same or approximately the same temperature coefficient. Because both currents have the same or approximately the same temperature coefficient, the voltage generated by these currents at the node VSUM is independent or approximately independent of temperature. This prevents changes in temperature from altering the value of Vcc at which the inverters 20 and 22 of FIG. 2 cause the switching circuit 8 (FIG. 1) to switch between the primary and secondary power sources 4 and 5, respectively.

Conversely, Cordell discloses in FIG. 1 a circuit resulting "in a current having a temperature coefficient <u>proportional</u> to the absolute temperature." Col. 3, lines 15-16 (emphasis added). Cordell does make it clear that "The modifying resistor 42 has a resistance-temperature characteristic similar to that of the current setting resistor 40."

Cordell's resistors 40 and 42 have a positive temperature coefficient of about +2000 ppm/C. However, as shown in FIG. 1 and the description at col. 4, lines 3-20,

Cordell places th modifying resistor 42 in parallel with th base-emitter junction of transistor 34, which has a negative temperature coefficient of about –3000 ppm/C. Consequently, I3 has a negative temperature coefficient of -5000 ppm/C. As an explanatory example, assume the temperature rises 1 C. Therefore, the Vbe of transistor 34 decreases, thus decreasing the current I3 through R42. Furthermore, the resistance of R42 increases, thus further reducing the current I3. So the temperature affects that Vbe and R42 have on I3 are additive to give I3 a temperature coefficient of -5000 ppm/C. Conversely, the current through R40 (~I2 + I3) has a positive temperature coefficient of about 1300 ppm/C (column 2, line 12). As an explanatory example, assume the temperature rises 1 C. Therefore, the Vbe of transistor 34 decreases, thus increasing the current through R40. But, the resistance of R40 increases, thus reducing the current through itself. So the temperature affects that Vbe and R40 on the current through R40 are subtractive to give a temperature coefficient of 1300 ppm/C. Adding 1300 to 5000 = 6300 ppm/C. But then subtracting the 3300 ppm/C for the Vbe of transistor 32 gives 3000 ppm/C, which is approximately the desired 3300 ppm/C desired (Col. 4, lijne 17).

The Examiner seems to be arguing that the node between Cordell's R42 and R40 is equivalent to the node Vsum in the example of claim 59 above. This is inaccurate. Specifically, as discussed above, because the currents Isup and Iref have the same or approximately same temperature coefficients, the voltage at Vsum stays constant or approximately constant with temperature (provided Vcc remains constant). But as discussed above, Cordell's I2, which the examiner calls the comparison current, is designed to change with temperature. Furthermore, by virtue of the Vbe of transistor 34 changing with temperature, the voltage at the node between R42 and R40 does not stay constant with changes in temperature assuming the voltage at the node 36 is constant. Consequently, claim 59 and its dependent claims 60-62 are patentable over Cordell.

CONCLUSION

In light of the foregoing and in addition to the allowed claims 1-23, 48-55, and 63-67, claims 29-34, 41-44, and 57-62 as previously pending and claims 28, 40, 45-47, and

56 as amended are in condition for full allowance, and that action is respectfully requested.

If the Examiner believes that a phone interview would be helpful, he is respectfully requested to contact the Applicants' principal attorney Bryan Santarelli at (425) 455-5575.

DATED this 25 day of July, 2002.

Respectfully submitted,

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ALL PENDING CLAIMS

Claims 1-23. See issued patent.

28. A method, comprising:

generating a first current that changes with temperature according to a first polarity;

generating a second current that changes with temperature according to a second polarity;

combining the first and second currents to generate a reference current; and

comparing the reference current to a third current that is dependent on a power-supply voltage.

29. The method of claim 28 wherein:

the first current changes with temperature according to a positive polarity; and

the second current changes with temperature according to a negative polarity.

30. The method of claim 28 wherein:

the first current is proportional to temperature; and

the second current is inversely proportional to temperature

31. The method of claim 28 wherein:

the first current increases as temperature increases and decreases as temperature decreases; and

the second current decreases as temperature increases and increases as temperature decreases.

32. The method of claim 28 wherein combining the first and second currents comprises summing the first and second currents.

33. The method of claim 28 wherein combining the first and second currents comprises sinking the first and second currents from a node.

34. The method of claim 28 wherein combining the first and second currents comprises sourcing the first and second currents to a node.

40. A method, comprising:

generating a first current that increases as temperature increases and that decreases as temperature decreases;

generating a second current that decreases as temperature increases and that increases as temperature decreases;

generating a third current that is dependent on a first voltage; and

combining the first, second, and third currents at a node to generate a second voltage on the node.

41. The method of claim 40 wherein combining the currents comprises:

sinking the first and second currents from the node; and

sourcing the third current to the node.

42. The method of claim 40 wherein:

the first current is related to a thermal voltage; and

the second current is related to a voltage across a forward-biased p-n junction.

43. The method of claim 40 wherein:

the first current is related to a thermal voltage; and

the second current is related to a base-emitter voltage of a bipolar transistor.

44. The method of claim 40 wherein the second current is related to the natural logarithm of a current through a bipolar transistor.

45. A method, comprising:

generating a first current that is related to temperature according to a first polarity;

generating a second current that is related to temperature according to a second polarity;

combining the first and second currents into a reference current;

generating a third current that is dependent on a first voltage; and

comparing the third current to the reference current.

46. The method of claim 45 wherein:

the first current is related to a thermal voltage;

the second current is related to a voltage across a forward-biased p-n junction; and

the third current is dependent on a power-supply voltage.

47. The method of claim 45 wherein:

combining the first and second currents comprises sinking the first and second currents from a node; and

comparing the third current to the reference current comprises,

sourcing the third current to the node, and

comparing a second voltage on the node to a reference voltage.

48. A method, comprising:

generating a first current that is proportional to a threshold voltage of a field-effect transistor;

generating a second current that is proportional to a difference between a supply voltage and a threshold voltage of a second field-effect transistor;

generating a third current that is proportional to a base-emitter voltage of a first bipolar transistor;

generating a fourth current that is proportional to absolute temperature; and

driving a node with the first, second, third, and fourth currents.

49. Th m thod of claim 48 wh rein driving the node compris s:
sourcing the first and second currents to the node; and
sinking the third and fourth currents from the node.

50. The method of claim 48, further comprising comparing a voltage on the node with a reference voltage.

51. The method of claim 48 wherein the first field-effect transistor is matched to the second field-effect transistor.

52. The method of claim 48 wherein the threshold voltage of the first field-effect transistor is equal or approximately equal to the threshold voltage of the second field-effect transistor.

53. A method, comprising:

generating a first current that equals a product of a first constant and a threshold voltage of a first field-effect transistor;

generating a second current that equals a product of a second constant and a difference between a supply voltage and a threshold voltage of a second field-effect transistor;

generating a third current that equals a product of a third constant and a base-emitter voltage of a bipolar transistor;

generating a fourth current that equals a product of a fourth constant and a thermal voltage; and

driving a node with the first, second, third, and fourth currents.

54. The method of claim 53 wherein the first constant equals the second constant.

55. The method of claim 53 wherein driving the node comprises:
sourcing the first and second currents to the node; and
sinking the third and fourth currents from the node.

56. A method, comprising:

generating a first current that changes with temperature according to a first polarity;

generating a second current that changes with temperature according to a second polarity;

combining the first and second currents to generate a reference current; and

comparing the reference current to a third current that is proportional to a power-supply voltage.

57. The method of claim 28 wherein comparing the reference current comprises summing the reference current and the third current at a node.

58. The method of claim 28 wherein comparing the reference current comprises:

sinking the reference current from a node; and

sourcing the third current to the node.

59. A method, comprising:

generating a reference current having a first temperature coefficient; and

comparing the reference current to a supply-related current that is related to a power-supply voltage and that has or has approximately the first temperature coefficient.

60. The method of claim 59 wherein the reference current is independent of the power-supply voltage.

61. The method of claim 59 wherein comparing the reference current comprises summing the reference current and the supply-related current at a node to generate a voltage.

62. The method of claim 59, further comprising:

wherein comparing the reference current comprise summing the ref rence current and the supply-related current at a node to generate a voltage;

connecting the power-supply voltage to a load if the voltage is greater than a predetermined level; and

connecting a secondary supply to the load if the voltage is less than the predetermined level.

63. A method, comprising:

generating a first current that is related to temperature according to a first polarity;

generating a second current that is related to temperature according to a second polarity;

combining the first and second currents into a reference current;

generating a third current that is related to temperature according to the first polarity;

generating a fourth current that is related to a supply voltage and that is related to temperature according to the second polarity;

combining the third and fourth currents into a supply-related current; and

comparing the reference current to the supply-related current.

64. The method of claim 63 wherein the fourth current is proportional to the supply voltage.

65. The method of claim 63 wherein the supply-related current is proportional to the supply voltage.

66. The method of claim 63 wherein:

the first and third currents are inversely proportional to temperature; and

the second and fourth currents are proportional to temperature.

67. The direct current sum bandgap voltage comparator of claim 24 wherein $K_4 = K_1$.